

CHARGE NUMBER: 1706
PROJECT TITLE: TOBACCO PHYSICS
PERIOD COVERED: May 1 - May 31, 1973
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A. Conversion of Rod to Smoke^(1,2)

Work has continued on the addition of the solid phase equations to general combustion program. At present we feel that the weight loss, condensation, and CO, CO₂ production can be written in kinetic form. The CO and CO₂ production from tobacco as a function of temperature is being fit to two and four one-step kinetic expressions respectively. The temperature dependent part of the condensation is being derived from the weight loss function minus the CO, CO₂ at each temperature. The spatial dependence of the condensation function has been derived from recent data reported by Palmer. (3) Palmer's data indicates an apparent increase in TPM production of a burning cigarette appears to be widely distinct from a steady-state process. Indications are that 25-35 per cent of the TPM produced in a puff is deposited in the first 6.5 mm of rod behind the coal, 10-20% in the second 6.5 mm, and negligible amounts thereafter.

The new variable parameter smoking machine has been constructed and is presently being checked and calibrated. Shortly, we will begin obtaining data on cigarette TPM output and filter efficiencies as a function of flow rate.

A combination smoking machine and gas sampling system has been constructed for the purpose of sampling the gas phase as a function of distance behind the coal in a burning cigarette. A gas chromatographic technique is being used to measure the pertinent gases (i.e. N₂, CO, CO₂, and O₂). (4)

B. Catalysis Mechanism Studies⁽²⁾

The reflectance and transmittance cell compartments of the new Beckman DK-1 spectrophotometer have both been checked and appear to be satisfactory. All detectors are operating as specified. Reflectance spectra of supported metal oxides are in agreement with previous work. The transmittance attachment will be used to carry out in situ NO analysis of synthetic gas mixture exposed to potential NO active filter materials.

The spectra scan 750 Residual Gas Analyzer has been set up to investigate the CO on Al₂O₃ and the permanganate catalysts, hopefully

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to determine the basis for their catalytic activity. The common power supply for the ion energy and the electron collector, voltages was found to be faulty and has been corrected. The Keithley 416 picoammeter was not operating correctly and was sent to the factory for repair. Modifications of the vacuum system, are being made to allow evacuation of the catalyst material through an activated charcoal trap in order to collect gases given off by the catalyst during evacuation. (5)

C. Miscellaneous (6)

Sensor substrates are being made to send to the fourteen companies actively interested in licensing the technology.

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References:

- (1) A. C. Lilly, Book 6292, pp. 1-10.
- (2) Allen Kassman, Book 6277, pp. 25-33.
- (3) A. M. Palmer, Special Report No. 73-060, April 27, 1973.
- (4) H. V. Lanzillotti, Book 5584, pp. 62-63.
- (5) J. C. Crump, Book 5411, pp. 86-88.
- (6) C. O. Tiller, Book 6148, pp. 49-58.



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